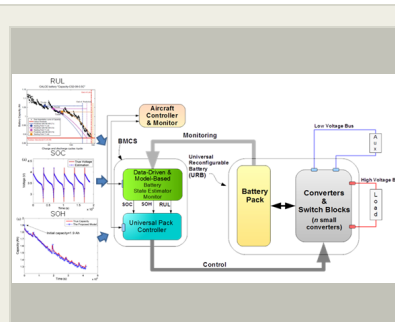


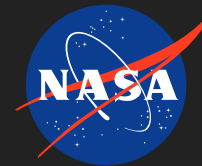
Completed Technology Project (2016 - 2016)

NASA seeks intelligent monitoring for hybrid and/or all electric propulsion systems, as well as methods to significantly extend the life of electric aircraft propulsion energy sources. Lithium-based batteries will continue to play a key role as an electric propulsion source due to their high energy and power densities. However, the requirement to advance towards more fuel efficient and environmentally friendly aircrafts demands battery systems that can operate for longer periods of time in a safer and more reliable manner. Efforts within the commercial aviation sector also indicate strong interest in this area. As an example, Boeing is developing hybrid airplanes as part of the Subsonic Ultra Green Aircraft project funded by NASA, and has also developed the first hybrid electric airplane in cooperation with Cambridge University. On the battery monitoring and control area, focus has been mostly aimed at achieving accurate and stable long-term estimation of cell State of Charge, State of Health, and Remaining Useful Life. These efforts have achieved excellent progress, and accuracies below 3% error are common today. We propose a new universal architecture that intelligently utilizes this estimated information and turns it into tangible actions to satisfy application demands while simultaneously improving on battery's health/life performance.



A Battery Management and Control System using a Universal Reconfigurable Architecture for Extended Health of Batteries in Hybrid and/or All-Electric Propulsion Systems, Phase I

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A Battery Management and Control System using a Universal Reconfigurable Architecture for Extended Health of Batteries in Hybrid and/or All-Electric Propulsion Systems, Phase I

Completed Technology Project (2016 - 2016)

Organizations Performing Work	Role	Type	Location
X-wave Innovations	Lead Organization	Industry Women-Owned Small Business (WOSB)	Gaithersburg, Maryland
● Armstrong Flight Research Center(AFRC)	Supporting Organization	NASA Center	Edwards, California

Primary U.S. Work Locations	
California	Maryland

Project Transitions



June 2016: Project Start

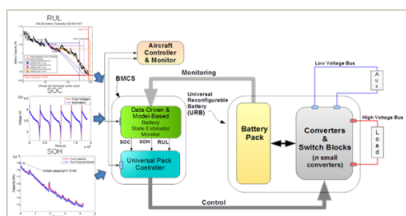


December 2016: Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/139455>)

Images



Briefing Chart Image

A Battery Management and Control System using a Universal Reconfigurable Architecture for Extended Health of Batteries in Hybrid and/or All-Electric Propulsion Systems, Phase I
(<https://techport.nasa.gov/image/134358>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

X-wave Innovations

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

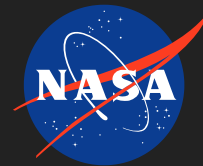
Carlos Torrez

Principal Investigator:

Carlos Rentel

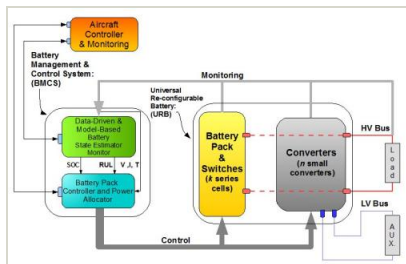
Co-Investigator:

Carlos Rentel



A Battery Management and Control System using a Universal Reconfigurable Architecture for Extended Health of Batteries in Hybrid and/or All-Electric Propulsion Systems, Phase I

Completed Technology Project (2016 - 2016)



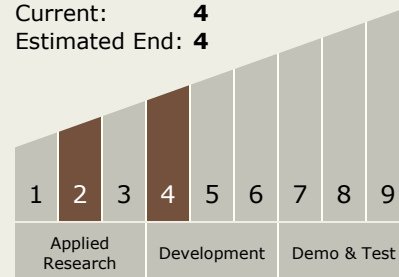
Final Summary Chart Image

A Battery Management and Control System using a Universal Reconfigurable Architecture for Extended Health of Batteries in Hybrid and/or All-Electric Propulsion Systems, Phase I Project Image

(<https://techport.nasa.gov/image/136268>)

Technology Maturity (TRL)

Start: 2
Current: 4
Estimated End: 4



Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
 - TX03.2 Energy Storage
 - TX03.2.1 Electrochemical: Batteries

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System